

# **Roofing, Flashing, Weather-Proof Membranes**

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# Roofing Types

- Low Slope
- Steep Slope
- Metal Roofing

# Low Slope

## Membrane

### Elastomeric Membrane Roofing

- Ethylene Propylene Diene Monomer (EPDM)

### Thermoplastic Membrane Roofing

- Polyvinyl Chloride (PVC)
- Thermoplastic Polyolefin (TPO)

# Low Slope

## Membrane

EPDM, PVC, TPO

- 1. Fully Adhered*
- 2. Mechanically Fastened*
- 3. Ballasted*
- 4. Perimeter securement similar for all three styles.*
5. Metal Fascia at perimeter securing the roofing



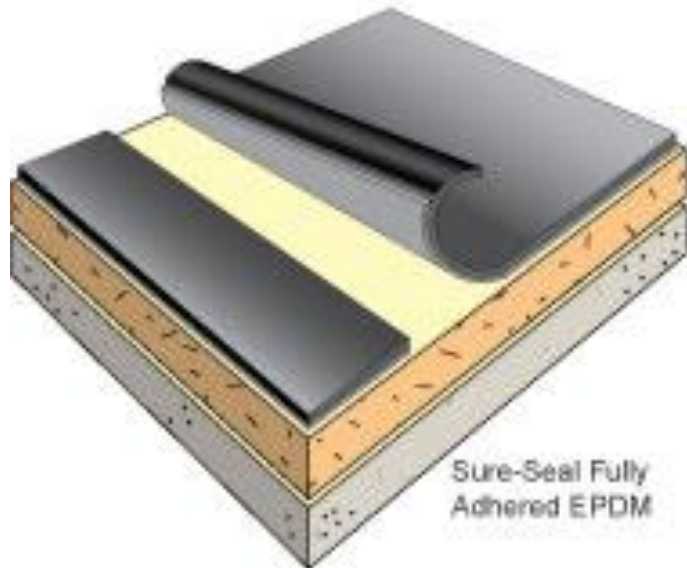
# Low Slope - Membrane

## ***1. Fully Adhered***

- a. Insulation layers screwed down or adhesively secured to substrate.*
  - i. Fastening or adhesive density dependant on wind resistance requirements.

# EPDM Roofing Systems

## Fully adhered



## Ballasted roofing systems













TC1 HALL 3-K1-07





# Multipurpose Fastener











**CARTISLE**  
ONE JOB  
COLPDMR

# Low Slope - Membrane

## ***2. Mechanically Fastened***

### ***a. Insulation Layers screwed down***

- i. High wind areas require air barrier below insulation on air permeable decks, wood, steel
  - 1. Increased fastening required with air barrier so insulation layers take most of load from air leakage from building interior.*
- ii. Concrete, Gypsum, and Tectum deck do not require the air barrier due to monolithic installation.

# EPDM Roofing Systems

**Fully adhered and mechanically fastened**



# Low Slope - Membrane

## **3. *Ballasted***

*a. Insulation layers normally not fastened, and are loose laid*

i. Increased fastening required with air barrier so insulation layers take most of load from air leakage from building interior. This is typically at perimeters and corners up to 12' width dependant on building height or width of roof.

*b. Membrane loose laid and secured with ballast rocks.*

i. Average weight around 12# in field of roof 15# at perimeters and 20# in corners

1. Not allowed along the coast for buildings over 15' in height 120 mph wind zone.

# Low Slope - Membrane

## ***4. Perimeter securement similar for all three styles.***

- a. Membrane is secured along perimeter parapets.
  - i. Securement of an underlying reinforced strip of membrane to the structure and then adhering or welding the membrane to the strip
  - ii. Fastening of the perimeter of the membrane to the structure with screws/ anchors and plates
    - 1. Membrane flashing overlaps past the securement locations and is sealed to the field membrane and up the parapet.













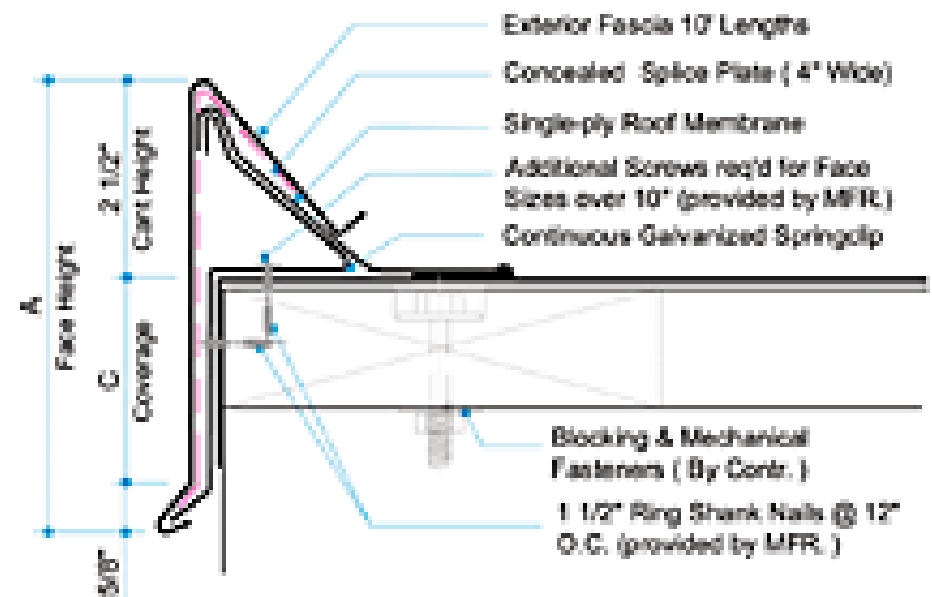


# Low Slope - Membrane

## **5. Metal Fascia at perimeter securing the roofing**

- a. Fascia materials to comply with ANSI ES-1.
  - i. Usually a prefabricated and tested assembly.
- b. Contractor brake metal does not normally comply unless the sheet metal shop has been certified by a testing laboratory
- c. Not required for sloped roof where the water drains off the edge.





**Notes:**

1. Extruded Fascia is available in a slightly different profile.
2. Coordinate installation with Membrane MFR.





# EPDM Roofing Systems

**Ethylene Propylene Diene Monomer (EPDM)**



# EPDM Roofing Systems

## Factory-Applied Tape



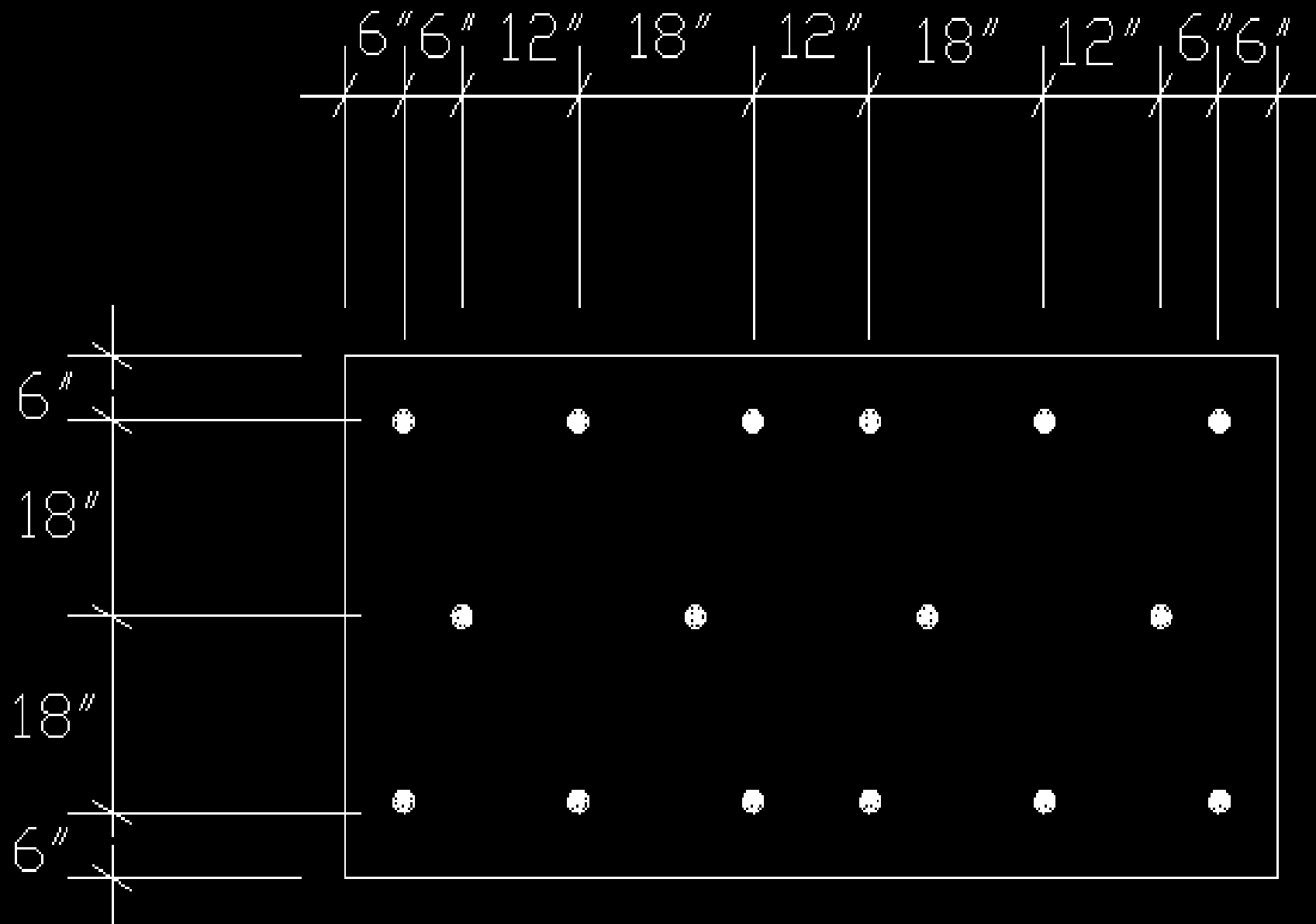












FASTENING PATTERN 4'X8"  
16 FASTENERS PER BOARD





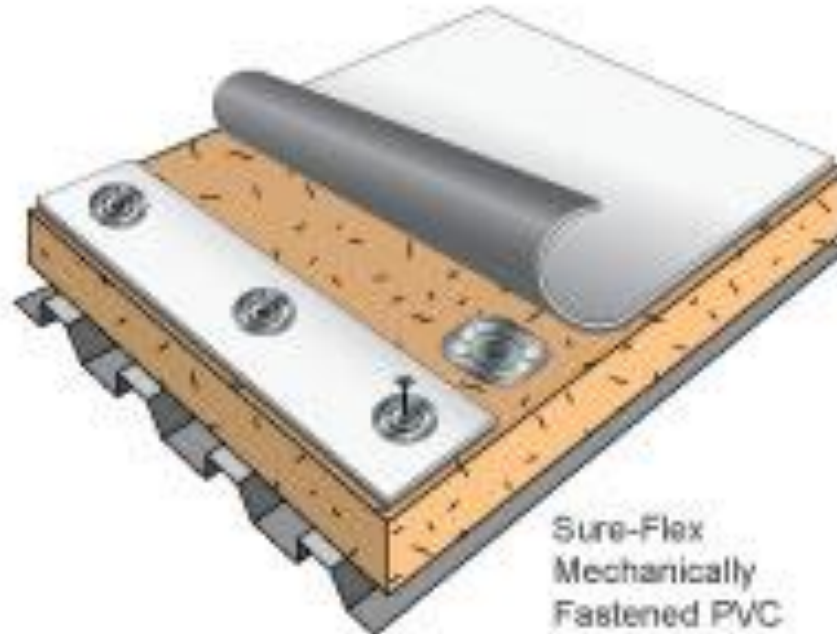
# PVC Roofing Systems

## Polyvinyl Chloride (PVC) Roofing



# PVC Roofing Systems

**Mechanically fastened and fully adhered PVC roofing systems**







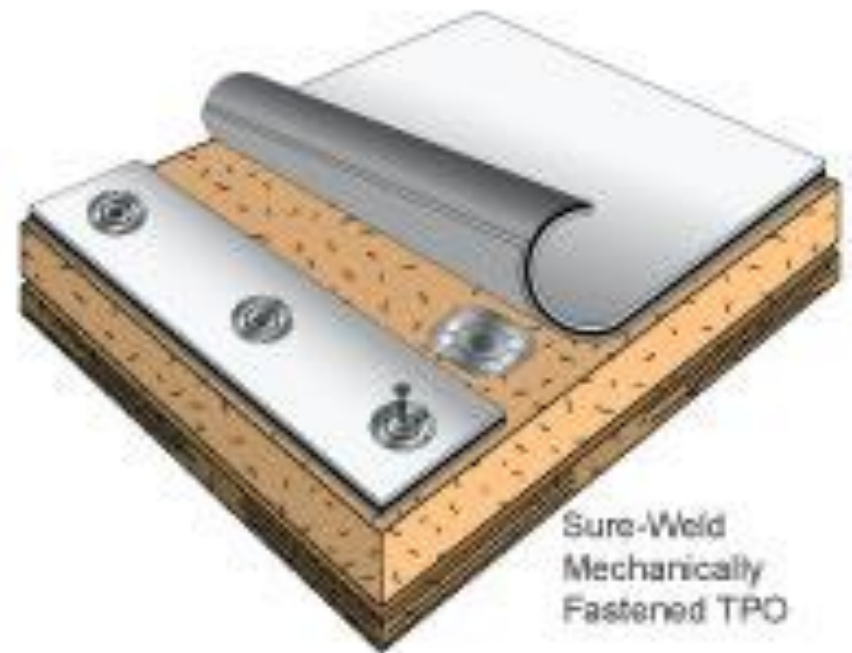
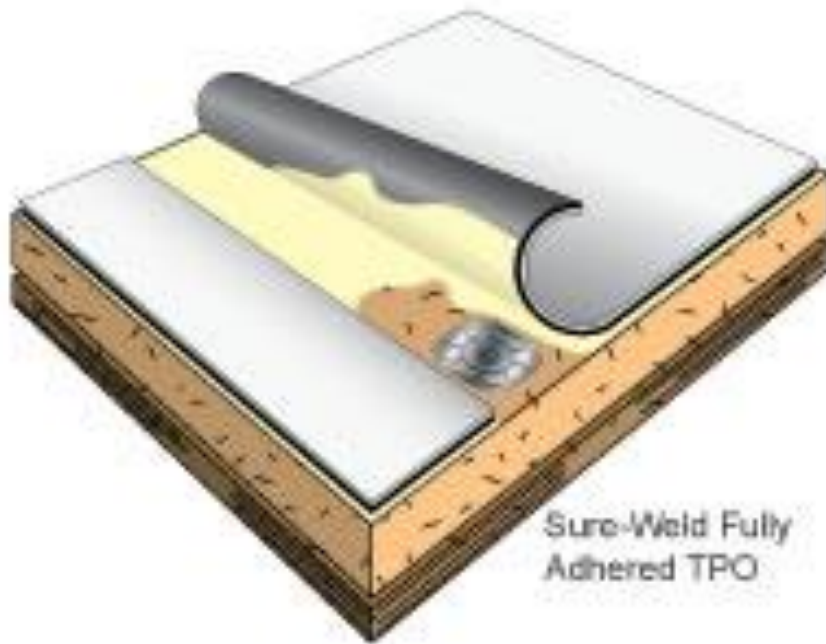
# TPO Roofing Systems

## Thermoplastic Polyolefin (TPO) Roofing



# TPO Roofing Systems

**Mechanically fastened and fully adhered TPO roofing systems**



# Low Slope – Built Up Roofing

## ii. Built Up Roofing

- 1. Insulation layers adhered with asphalt on concrete decks or secured with screws on steel or wood decks.*
- 2. Installed over nailed ply of fiberglass base sheet on nailable decks without insulation.*
- 3. Layers of fiberglass or organic felts laminated with asphalt or coal tar.*



# Low Slope – Built Up Roofing

- 1. Insulation layers adhered with asphalt on concrete decks or secured with screws on steel or wood decks.***

# Low Slope – Built Up Roofing

***2. Installed over nailed ply of fiberglass base sheet on nailable decks without insulation.***

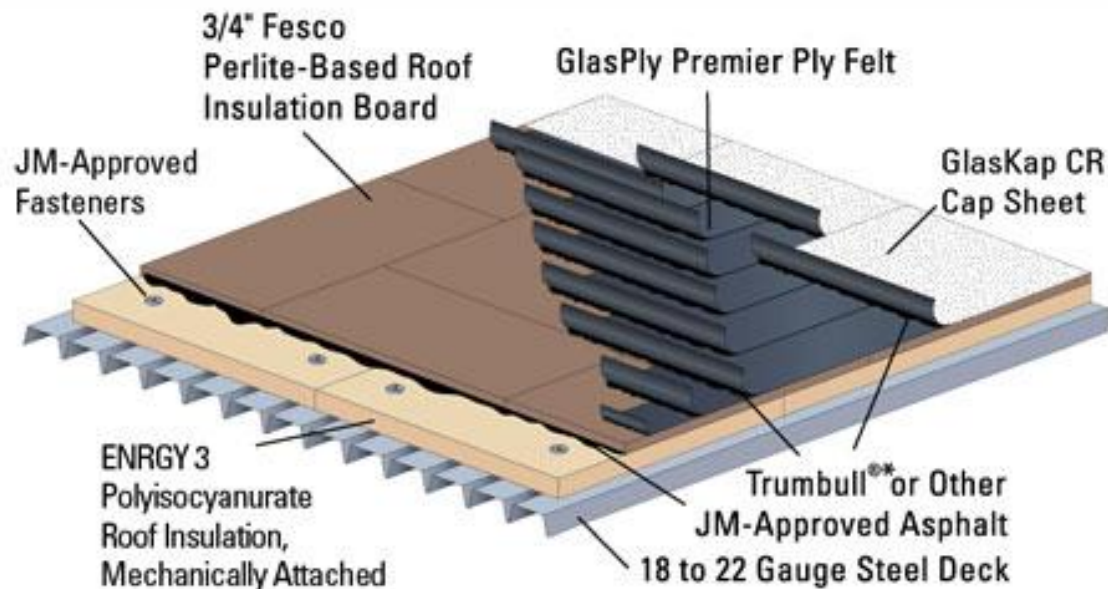
# Low Slope – Built Up Roofing

## ***3. Layers of fiberglass or organic felts laminated with asphalt or coal tar.***

- a. Felts to be broomed in place while tar is still hot.*
- b. Surfaced with gravel set in hot bitumen or coated over with asphalt or other coating*
  - i. Asphalt emulsions*
  - ii. Aluminum coating*
  - iii. Acrylics*
- c. Hybrid system surface the built up membrane with a modified bitumen granule surfaced cap sheet.*



# Built Up Roofing System



\*Trumbull is a registered trademark of Owens Corning

**4GIC CR**







# Low Slope – Modified Bitumen

## **iii. Modified Bitumen**

- 1. Insulation layers adhered with asphalt or adhesive on concrete, or secured with screws on steel or wood decks.*
- 2. Installed over nailed ply of fiberglass base sheet on nailable decks without insulation.*
- 3. Membrane installed in one or two layers  
Installation in hot asphalt, cold adhesives or by torch.*









# Low Slope and Code

## **2003 International Building Code/Connecticut**

### **Chapter 15 – Roof Assemblies & Roof Top Structures**

1504 Performance Requirements

1507.10 Built-up roofs

1507.11 Modified bitumen roofing

1507.12 Thermoset single-ply roofing

1507.13 Thermoplastic single-ply roofing

1507.14 Sprayed polyurethane foam roofing

1507.15 Liquid-applied coatings

## **2003 International Residential Code/CT**

R905 Requirements for Roof Coverings

R905.9 Built Up roofs



# Low Slope - Continued

## ***c. Surface burning to be Class A, B, or C***

### ***Section 1505 – Fire Classification***

***Class A*** roof assemblies are effective against severe fire test exposure.

***Class B*** roof assemblies are effective against moderate fire-test exposure

***Class C*** roof assemblies are effective against light fire-test exposure.

# Low Slope - Continued

*d. Interior Fire Resistance dependant on  
Building classification*

# Low Slope – Wind Loads

*e. Wind resistance to comply with basic wind speed as listed in Chapter 16*

i. 120 mph at coast

ii. 110 mph for remainder of state

IBC Code References:

Section 1609 Wind Loads

Appendix K – Snow Loads, Wind Speeds and MCE Spectral Accelerations.



# Green Roofing

- Roofing with plantings, planters, and or paving.













# Steep Slope

## ***a. Asphalt Shingles***

- i. Fastening dependant on Basic Wind Speed*
- ii. Nails and fasteners shall be corrosion resistant.*
- iii. Ice Dam Materials*

# Steep Slope - Asphalt Shingles

- i. **Fastening** with 4-6 nails is dependant on Basic Wind speed in town of installation, for standard installation
  - 1. *Basic wind speed of 110 mph or greater requires 6 nails per shingle*
  - 2. *Steep roof over 20" / 12 require 6 nails*
    - a. *Steep roofs also require hand sealing of the shingles due to lack of weight of shingle against seal strips.*







# Steep Slope - Asphalt Shingles

## ***ii. Nails shall be corrosion resistant.***

***1. Galvanized, Aluminum, Copper, or stainless nails listed as acceptable***

***a. Plated nails not listed therefore not acceptable.***

2. Nails must be placed in the nailing locations identified on the shingles.

A. Nails to be set flush to the surface of the shingles. Overdriven, or installed on an angle are not acceptable















# Steep Slope - Asphalt Shingles

## iii. Ice Dam Materials

1. *Code requires ice dam material to extend 24" horizontally inside the building wall as a minimum.*
2. *Standard felt underlayment required for remainder of field of roof.*
3. *Low slope (<4"/12") underlayment requires 2 ply of underlayment felt or full coverage with ice dam material.*
4. *Ventilation required below the substrate to which the shingles are installed above the insulation.*
  - a. *Ventilation to be balanced 50% at ridge/ gable end, 50% at soffit.*
5. *Fiberglass shingles carry a class A fire rating*
  - a. *Organic shingles have class C rating*











# Steep Slope – Asphalt Shingles

## ***Code Reference***

### ***Section 1507 - Requirements for Roof Coverings***

*1507.2 Asphalt Shingles*

*1507.2.6 Fasteners*

*1507.2.7 Attachment*

*1507.2.8.2 Ice Dam Membrane*



# Metal Roofing

## ***3. Metal Roofing***

a. Architectural and Structural standing seam

*i. Architectural generally from 2" in 12" and steeper*

*ii. Structural System*

# Metal Roofing

## ***i. Architectural - Generally from 2" in 12" and steeper***

- 1. Usually standing or batten seam.*
- 2. Seams locked and folded or snap on.*
  - a. Below 4" in 12" 2 ply of underlayment or ice dam full coverage required
  - b. Above 4" in 12" ice dam required at eaves for 24" inside building wall.
- 3. Seam heights vary from 1" to 2" plus.*
- 4. Require a structural deck*
- 5. Require wind rating usually a UL 90 listing in CT.*



# Metal Roofing

## ***ii. Structural System***

- 1. No deck required, attached to structural purlins or ,“C”, “Z” shapes attached to structure.*
- 2. Most have integral sealant in the seam as well as capillary breaks to prevent water siphoning through seam into building.*
- 3. Slopes as low as ¼” in 12” allowed by Manufacturers.*
- 4. Require wind rating usually a UL 90 listing in CT.*
- 5. Metal systems have a class A fire rating.*

# Metal Roofing

## ***Code Reference***

### ***Section 1507 - Requirements for Roof Coverings***

#### *1507.4 Metal Roof Panels*

##### *1507.4.1 Deck requirements*

##### *1507.4.4 Attachment*

#### *1507.5 Metal Roof Shingles*

##### *1507.5.1 Deck requirements*

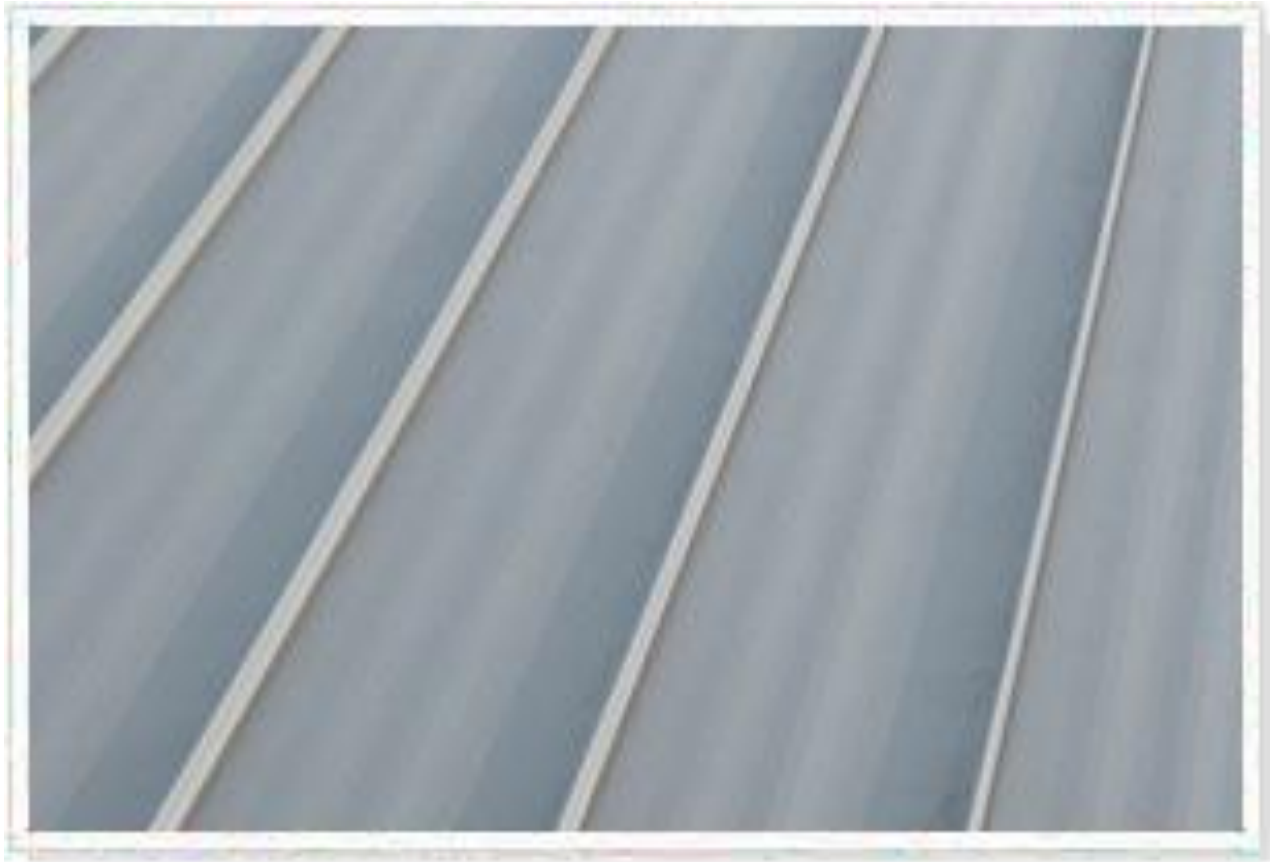
##### *1507.5.5 Attachment*





# **STANDING SEAM**

## **Metal ROOFING**





# Slate Roofing

- Slate to comply with ASTM C406
  - Grade S1 = 100 years
  - Grade S2 = 75 years
  - Grade S3 = 50 years













- Slate fastened with 2 nails per slate for nominal  $\frac{1}{4}$ " thick materials.
  - Nails normally are copper .
  - Slates over  $\frac{3}{4}$ " thick and 20" in length require 4 nails
- Slate can be ordered in several thickness's.
  - $\frac{1}{4}$ " is most common but can be provided in  $\frac{3}{8}$ ",  $\frac{1}{2}$ "  $\frac{5}{8}$ ",  $\frac{3}{4}$ ", and 1"

# Clay Tile Roofing

- Required to comply with ASTM C1167
  - Key test in this specification is resistance to freeze thaw for use in northern climates.
- There are many styles to chose from
  - S style
  - Barrel
  - Flat interlocking
  - Slab, which are installed similar to slate











# Questions

Thank You!

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